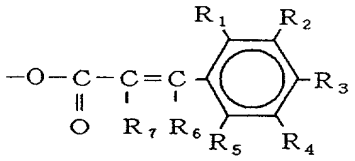
WHAT IS CLAIMED IS

1. A process for producing a retardation film, comprising producing a retardation film by a process including a step of irradiating a mixture of a photosensitive polymer and a low molecular weight compound with light, wherein the ratio z of solubility parameters calculated from the evaporation energy and molecular volume of these photosensitive polymer and low molecular weight compound is larger than 0.93 and smaller than 1.06.

2. The process for producing a retardation film according to Claim 1, wherein the photosensitive polymer has liquid-crystallinity.

3. The process for producing a retardation film according to Claim 1, wherein the photosensitive polymer is a photosensitive homopolymer or copolymer which has at least one of structures represented by the following molecular structure 1 to 9 and in which the main chain represented by the molecular structure 10 is a hydrocarbon, acrylate, methacrylate, maleimide, N-phenylmaleimide or siloxane and the low molecular weight compound has a molecular structure represented by the molecular structure 11 or 12.

[C1]



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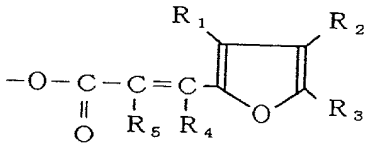

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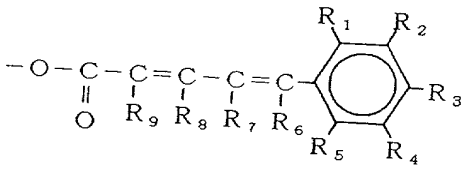

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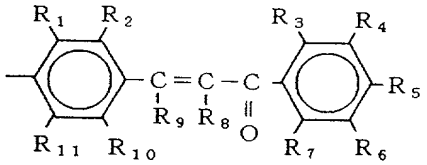

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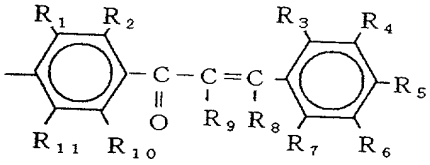

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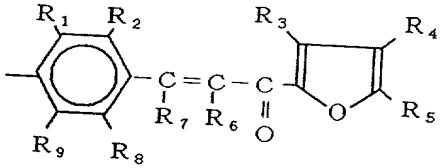

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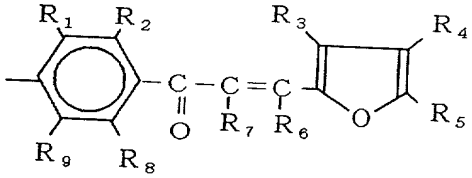

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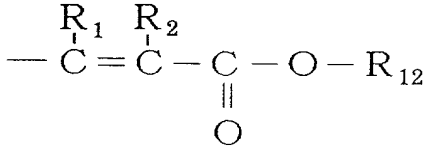

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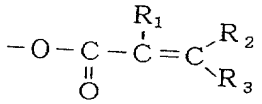

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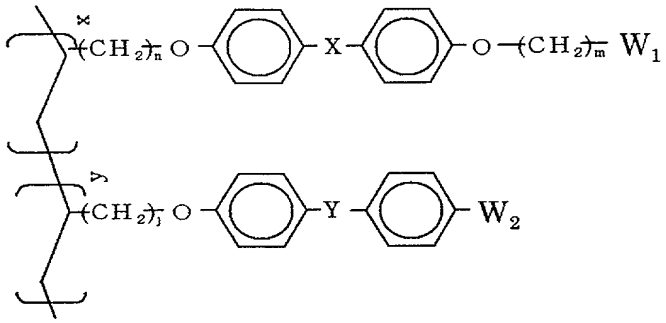

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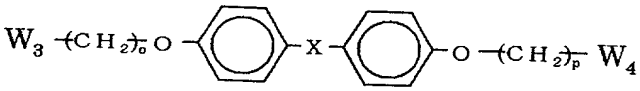

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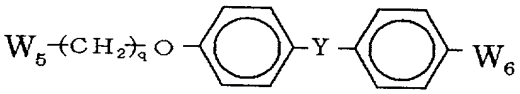

wherein $-R_1$ to $-R_{11}$ = -H, halogen group, -CN, alkyl group or alkyloxy group such as methoxy group or group obtained by fluorinating each of these groups, $-R_{12}$ = alkyl group, e.g., methyl group or ethyl group or group obtained by fluorinating each of these groups, x : y = 100 to 0 : 0 to 100, n = 1 to 12, m = 1 to 12, j = 1 to 12, o = 1 to 12, p = 1 to 12, q =

1 to 12, X, Y = none, -COO, -OCO-, -N=N-, -C=C- or -C_6H_4-, W_1, W_2, W_3, W_4, W_5, W_6 = structure represented by molecular structure 1, 2, 3, 4, 5, 6, 7, 8 or 9.

4. The process for producing a retardation film according to Claim 1, wherein the light to be irradiated includes linear polarized light or light in which perfectly polarized light component and non-polarized light component are intermingled.

5. The process for producing a retardation film according to Claim 1, wherein the light to be irradiated in said step of irradiation is irradiated on both of opposite principal surfaces of said mixture.

6. The process for producing a retardation film according to Claim 1, the process further comprising a step of heating and/or cooling a layer of said mixture after said step of irradiation.

7. The process for producing a retardation film according to Claim 1, the process further comprising a step of crosslinking the photosensitive polymer or low molecular weight compound constituting the film.

8. A retardation film produced by the process as claimed in Claim 1.

9. A process for producing a retardation film, comprising irradiating a film formed of a photosensitive polymer or a mixture of a photosensitive polymer and a low molecular weight compound with light with the incident angle changing in sequence.

10. The process for producing a retardation film according to Claim 9, wherein the light to be irradiated in said step of irradiation is irradiated on both of opposite principal surfaces of said mixture with the incident angle changing in sequence.

11. The process for producing a retardation film according to Claim 9, the process further comprising a step of heating and/or cooling said layer after said step of irradiation.

12. The process for producing a retardation film according to Claim 9, the process further comprising a step of crosslinking said photosensitive polymer or said photosensitive polymer and said low molecular weight compound.

13. The process for producing a retardation film according to Claim 9, wherein said photosensitive polymer has liquid-crystallinity.

14. The process for producing a retardation film according to Claim 9, wherein said low molecular weight compound has crystallinity or liquid-crystallinity.

15. A retardation film produced by the process as claimed in Claim 9.

16. The retardation film according to Claim 15, the film further comprising a uniaxial index ellipsoid layer or/and a biaxial index ellipsoid layer to be added.

17. A process for producing a retardation film, the process comprising irradiating a layer formed of a photosensitive polymer or a mixture of a photosensitive polymer and a low molecular weight compound with linear polarized lights having electric field oscillation planes differing from each other in at least two directions, wherein the light to be irradiated in at least one direction is irradiated in a direction oblique to the normal line of said layer.

18. The process for producing a retardation film according to Claim 17, wherein said process of irradiation includes a sub-step of irradiating the layer with linear polarized light in a direction oblique to the normal line of said layer and a sub-step of irradiating the layer with light having electric field oscillation plane on the same plane as that of said light in the normal direction of the layer.

19. The process for producing a retardation film according to Claim 17, wherein said process of irradiation includes a sub-step of irradiating the layer with linear polarized light in a direction oblique to the normal line of said layer and a sub-step of irradiating the layer with linear polarized light having electric field oscillation plane orthogonal to that of said light in the normal direction of the layer.

20. The process for producing a retardation film according to Claim 17, wherein said process of irradiation includes a step of irradiating said layer with linear polarized lights having electric field oscillation planes orthogonal to each other in two directions oblique to the direction of the normal line of the layer.

21. The process for producing a retardation film according to Claim 17, wherein the irradiation of the layer in the process of irradiation is conducted on both of opposite principal surfaces of the layer.

22. The process for producing a retardation film according to Claim 17, the

process further comprising a step of heating and/or cooling said layer after said step of irradiation.

23. The process for producing a retardation film according to Claim 17, the process further comprising a step of crosslinking said photosensitive polymer or said photosensitive polymer and said low molecular weight compound.

24. The process for producing a retardation film according to Claim 17, wherein said photosensitive polymer has liquid-crystallinity.

25. A retardation film produced by the process as claimed in Claim 17.

26. The retardation film according to Claim 19, the film further comprising adding a uniaxial index ellipsoid layer or/and a biaxial index ellipsoid layer.

27. The retardation film according to Claim 19, wherein two or more layers are laminated in such an arrangement that the optical anisotropic axes of these layers are orthogonal to each other.

28. The retardation film according to Claim 17, wherein said retardation film has the same optical characteristics equal to those of one in which a negative index ellipsoid is inclined.

29. A process for producing a retardation film, comprising a process of irradiating a layer made of a photosensitive polymer containing a positive index ellipsoid structure or a mixture of the polymer and a low molecular weight compound with non-polarized light or light including a perfectly polarized light component and a non-polarized light component, to control birefringence.

30. The process for producing a retardation film according to Claim 29 , wherein the ratio of three primary refractive indexes nx, ny and nz of the index ellipsoid in the film and the inclination of the nx axis with the normal line of the film surface are controlled by said process of irradiation.

31. The process for producing a retardation film according to Claim 29, wherein the term "control" is, specifically, to develop the same birefringence as in the case of combining a slant-oriented index ellipsoid, bend-oriented index ellipsoid or non-slanted uniaxial index ellipsoid.

32. The process for producing a retardation film according to Claim 29, the process further comprising a step of heating and/or cooling said layer after said process of irradiation.

33. The process for producing a retardation film according to Claim 29, wherein the irradiation with light in said process of irradiation is conducted on both of opposite principal surfaces of said layer.

34. The process for producing a retardation film according to Claim 29, wherein the irradiation with light in said process of irradiation is conducted in the direction inclined with the direction of the normal line of said layer.

35. The process for producing a retardation film according to Claim 29, wherein said photosensitive polymer has liquid-crystallinity.

36. The process for producing a retardation film according to Claim 29, wherein said low molecular weight compound has crystallinity or liquid-crystallinity.

37. The process for producing a retardation film according to Claim 29, wherein said low molecular weight compound has a reactive group which is crosslinked or polymerized by light or heat.

38. The process for producing a retardation film according to Claim 29, the process further comprising a step of crosslinking said photosensitive polymer and/or said low molecular weight compound.

39. A retardation film produced by the process as claimed in Claim 29.